Lock And Load: Reengineered USAR Marksmanship Training

Introduction

Prompted by the combination of budget cutbacks, escalating ammunition costs, reduced access to live-fire ranges, reported performance deficiencies, and ever-present training time constraints, the U.S. Army Reserve (USAR) is searching for better ways to train and evaluate small arms marksmanship through the use of training devices. To this end, the U.S. Army Research Institute (ARI) are working in partnership with the U.S. Army Reserve Command's (USARC's) 84th Institutional Training Division (DIVIT) and Small Arms Training Team (SATT) to develop and evaluate a device-based rifle (M16A2) marksmanship sustainment training program for use at home station on drill weekends. The goal of this effort is to field a program of instruction (POI) that will produce marksmanship proficiency levels that meet, or exceed, unit readiness requirements while minimizing the resources needed to do so.

Development of this POI is now complete. It contains a series of exercises that call for use of the BeamhitTM Laser Marksmanship Training System (LMTS) to support the practice of marksmanship fundamentals (steady position, aiming, breath control, and trigger squeeze), as

Figure 2: Firing with the LMTS laser transmitter

well as shot grouping and weapon battlesight zeroing procedures. LMTS is an indoor, laser-emitting device that supports the engagement of targets without the firing of live ammunition. Its major components include a battery-powered laser transmitter, a mandrel to which the laser is attached and then inserted into the muzzle of the rifle, a variety of laser-sensitive targets, and a laptop computer (Figure 1). The device allows soldiers to use their own weapons (Figure 2) and provides feedback on both point of aim and point of impact. These capabilities, coupled with the added features of low cost, ease of setup, operation, and upkeep, prompted the USAR's selection of LMTS for use within the newly developed POI.

Overlaid upon the POI is the implementation or delivery strategy depicted in Figure 3. This strategy is competency based and envisions the use of an LMTS-based pretest to predict/identify which soldiers actually need training (those unlikely to live-fire qualify) and an LMTS-based posttest to determine when they have received enough to ensure a reasonable probability of qualification.

We are now collecting the performance data needed to assess the impact of the LMTS-based POI and the ability of LMTS-performance to predict live-fire qualification scores. Thus

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**Figure 1:
A sample LMTS electronic target and laser transmitter with attached mandrel**

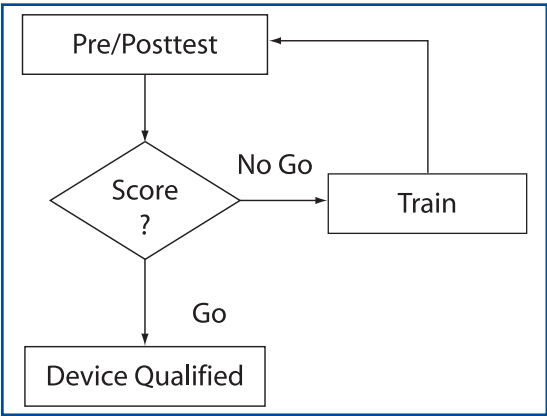# Lock And Load: Reengineered USAR Marksmanship Training

Figure 3: Flowchart of implementation strategy

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far, we have tested the POI with initial entry trainees to compare its impact relative to that of the Basic Rifle Marksmanship (BRM) training program currently in place at Fort Benning, GA. Our findings show that replacement of currently used training devices, such as the dime [washer], target [shadow] box, Multipurpose Arcade Combat Simulator (MACS), and Weaponeer, with LMTS would

(a) reduce the number of rounds fired for live-fire grouping and zeroing by about 20%, and (b) increase the number of target hits at known distances (Tables 1 and 2, respectively). Encouraged by these findings for initial training, the USAR has asked ARI to proceed with plans for research to answer questions about the POI's impact on sustainment performance and the ability to predict live-fire qualification scores from LMTS-based performance.

In response to this request, we have begun collecting additional data to answer both of these questions. Findings to date suggest that the answer to the prediction question is yes. Based on a statistically significant correlation ($r = .55$) found between LMTS and live-fire qualification scores on the 25m Alternate Qualification Course of Fire, we have been able to develop an easy-to-use tool, in look-up table format (Table 3), for predicting the latter from the former.

Table 1: Grouping and Zeroing Results

	POI	
Mean Number of Rounds Fired Per Trainee	Current	LMTS
Shot Grouping	16.35	13.52*
Weapon Zeroing	26.55	20.97*

*$p < .05$.

Table 2: Known Distance Results

	POI	
Mean Number of Rounds Fired Per Trainee	Current	LMTS
Mean Number of 175yd Target Hits	13.34	14.75*
Mean Number of 300yd Target Hits	4.32	5.38*
Percentage of Qualifiers at 175yd	54	69*
Percentage of Qualifiers at 300yd	44	66*

*$p < .05$.

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Using this tool, USAR commanders or trainers can predict their soldiers' live-fire qualification scores, as well as the likelihood of qualification at the Marksman, Sharpshooter, and Expert levels. A soldier with an LMTS score of 19 (Column 1), for instance, would be predicted on the average to fire 26 on the live-fire range (Column 2) and have a 50% chance of successful record fire qualification at the Marksman level (Column 3), and a 10-20% chance of qualification at the Sharpshooter level (Column 4). A soldier with an LMTS score of 30 would be predicted to fire 31 on the range and have a 80% chance of qualifying Marksman, a 30-40% chance of qualifying

Sharpshooter, and a 10-20% chance of qualifying Expert (Column 5), and so forth.

When used for pretesting, this tool can serve as a diagnostic instrument to support quick and accurate assessments of a soldier's need for sustainment training (when the likelihood of qualification is low), as required by the POI implementation plan, thereby making sure that scarce training resources are devoted to those most in need. The tool can also be used after training to determine if enough has been provided (when the likelihood of qualification is good). Lastly, the tool provides an empirically derived set of marksmanship probabilities

Table 3: LMTS-Based Predicted Chances of 1st-Run Qualification at Marksman ($\geq$26 hits), Sharpshooter ($\geq$33 hits), and Expert ($\geq$38 hits) on 25m Alternate Qualification Course (Alt C).

LMTS Score	Predicted Average Live-Fire Score	Chances (%) of a Live-Fire Score		
		$\geq$26	$\geq$33	$\geq$38
3	18	10	—	—
8	21	20	—	—
12	23	30	—	—
16	25	40	—	—
18	25	—	10	—
19	26	50	—	—
22	27	60	—	—
24	28	—	20	—
26	29	70	—	—
28	30	—	30	—
29	30	—	—	10
30	31	80	—	—
31	32	—	40	—
34	33	—	—	20
35	33	—	50	—
36	34	90	—	—
38	34	—	60	—
39	35	—	—	30

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for use in setting qualification standards, in the form of cutoff scores, on LMTS. Such standards would be required if, and when, the USAR should decide to use LMTS-based scores in lieu of range scores for purposes of yearly qualification at times when range facilities are not readily available.

Although sustainment training effectiveness data still need to be collected, the positive results found thus far for the training of basic rifle marksmanship and for the prediction of live-fire qualification scores suggest that the USAR's use of LMTS for sustainment training is also likely to be successful. We will keep you posted on how the findings come out.

In the meantime, the present results will enable the USAR to take a giant step toward meeting the Total Army readiness challenge through more productive home-station rifle marksmanship training and evaluation while saving precious time and ammunition in the process. With their marksmanship skills at the ready, USAR soldiers will be better prepared to mobilize and deploy on short notice when called upon to support worldwide contingency operations.

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